



THE COMMONWEALTH OF MASSACHUSETTS WATER RESOURCES COMMISSION

WATER RESOURCES COMMISSION DECISION

September 13, 2001

Town of Foxborough Witch Pond Wells Interbasin Transfer Application

I. DECISION

On September 13, 2001, the Massachusetts Water Resources Commission (WRC) approved, with conditions, the town of Foxborough's request for an Interbasin Transfer for two proposed wells adjacent to Witch Pond. This vote was taken after review of the facts provided by the applicant, analysis of the associated data, and consideration of public and agency comments concerning this proposal.

II. BACKGROUND

On July 27, 2000, the WRC received a request for approval of an action to increase the present rate of interbasin transfer under the Interbasin Transfer Act (M.G. L. Chapter 21 §§ 8B-8D) from the Town of Foxborough. Foxborough is proposing to develop two new gravel-packed wells in a sand and gravel aquifer in the Witch Pond Swamp west of Witch Pond. The well location is in the Bungay Brook subbasin of the Ten Mile River basin (**Figure 1**).

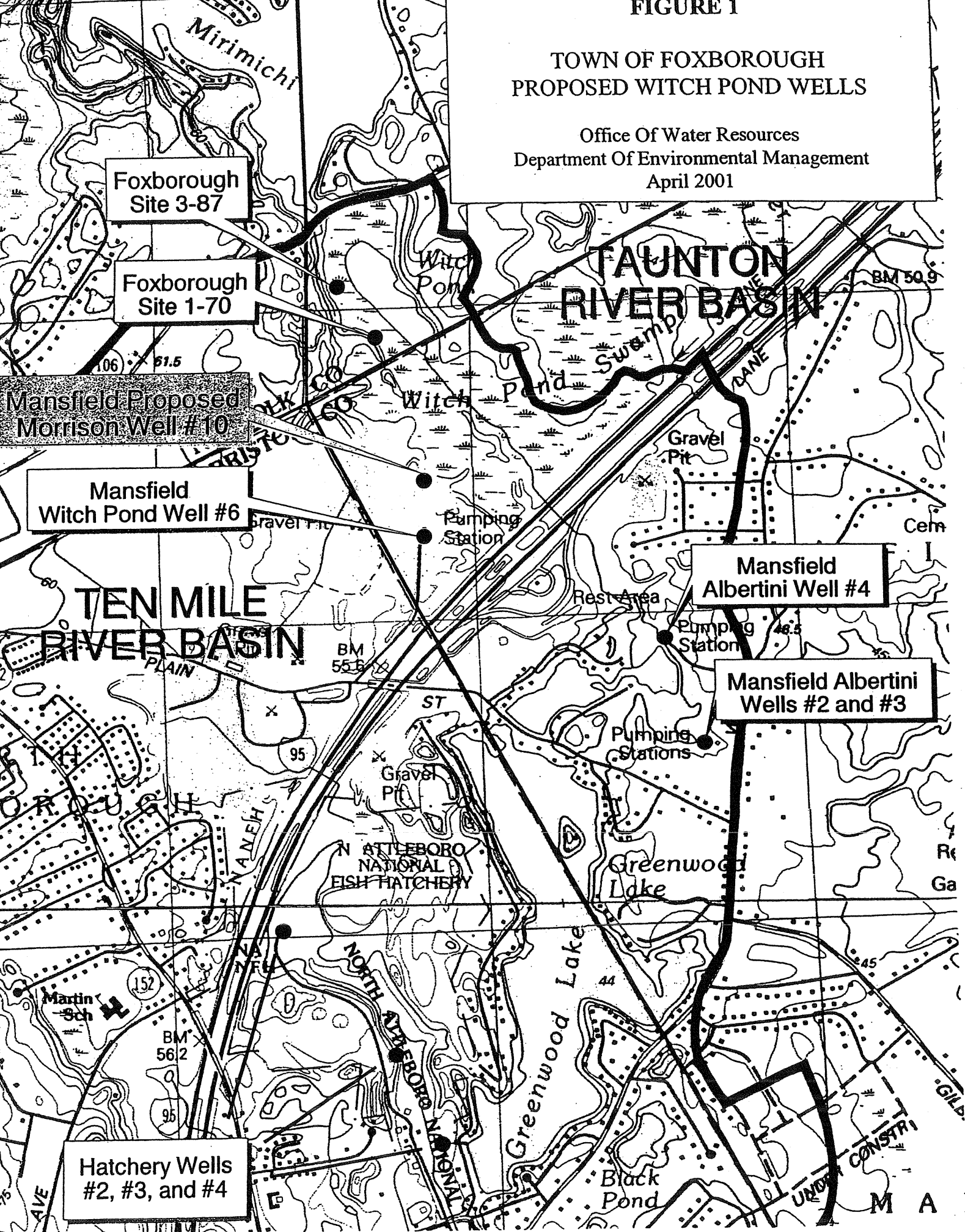
On February 8, 2001, after receiving all necessary information, the WRC accepted the application as complete. Two public hearings on the application, as required by 313 CMR 4.06, were held on March 29, 2001, in Attleboro, for the donor basin, and April 5, 2001, in Foxborough, the receiving community. A third public hearing to take comments on the WRC staff recommendation was held on May 24, 2001 in Foxborough. Responses to comments received through the public hearing processes are available in separate reports from the Water Resources Commission.

The WRC discussed the merits of the application at its May 10, 2001 meeting. Comments and concerns raised by the staff recommendation were discussed at the August 9, 2001 meeting. **On September 13, 2001, the Water Resources Commission, in an eight to zero vote (8-0), approved with conditions, the town of Foxborough's request for an Interbasin Transfer for its proposed Witch Pond Wells.**

FIGURE 1

TOWN OF FOXBOROUGH
PROPOSED WITCH POND WELLS

Office Of Water Resources
Department Of Environmental Management
April 2001



III. FACTS PERTAINING TO THE APPLICATION

1. The Town has land area in the Ten Mile River basin, the Neponset River basin and Taunton River basin.
2. Foxborough is applying for permission to transfer water from the proposed Witch Pond Wells, to be developed within town, in the Ten Mile River basin. The wells have a DEP-approved capacity of 1.44 million gallons per day (mgd).
3. Water from these wells will be used within the town of Foxborough and discharged as wastewater to the Mansfield regional wastewater treatment plant in the town of Norton, in the Taunton River basin.
4. The Interbasin Transfer Act is triggered because water from this proposed source crosses a town line and a basin line before being discharged. Therefore there is no intratown exemption.
5. The WRC approved an Interbasin Transfer Act request from the Town of Mansfield on June 8, 2000, for the Morrison Well, which is downstream of this site, in the same subbasin and aquifer.
6. Foxborough currently has six existing water supply sources, four in the Taunton River basin: Station #2 and Station #4 in the Wading River at Mansfield subbasin and Station #3 and Station #3a in the Rumford River at Foxborough subbasin; and two in the Neponset River basin: Station #1 and Station #5. **(Figure 2)**
7. Foxborough is registered to withdraw 1.6 mgd from the Taunton River basin and 0.64 mgd from the Boston Harbor basin – Neponset River subbasin. The Town is permitted to withdraw an additional 0.73 mgd from the Boston Harbor basin – Neponset River subbasin until 2010. In addition, DEP issued Foxborough a Water Management Act Permit for the Witch Pond Wells in 1993 giving a permitted amount for these sources of 0.12 mgd starting in December 2001. This gives Foxborough a total permitted withdrawal amount of 3.09 mgd.

IV. BASIS FOR THE WRC DECISION

This interbasin transfer application was reviewed on its own merits. This decision is made on facts relevant to the Interbasin Transfer Act and its regulations. This application was evaluated against the eight criteria outlined in the regulations (313 CMR 4.05), as well as the Interbasin Transfer Act Performance Standards adopted by the WRC in August 1999. The application and associated data underwent an extensive review and analysis by DEM's Office of Water Resources, DEP's Office of Watershed Management and Southeast Regional Office Drinking Water Program, DFWELE's Division of Fisheries and Wildlife, Division of Marine Fisheries, Natural Heritage and Endangered Species Program and Riverways Program, and the EOEA Ten Mile River Basin Team Leader.

Attachment 1 provides a synopsis of how the application addresses these criteria and the associated Performance Standards. The major issues raised with this project concern MEPA compliance, existence of viable in-basin sources, water conservation, impacts to the surrounding Atlantic White Cedar swamp and Witch Pond, which serve as habitat for two endangered species

Boston Harbor River Basin
Neponset Subbasin

WALPOLE

Taunton River Basin
Rumford River Subbasin
(Foxborough)

HAM

Taunton
Canoe I

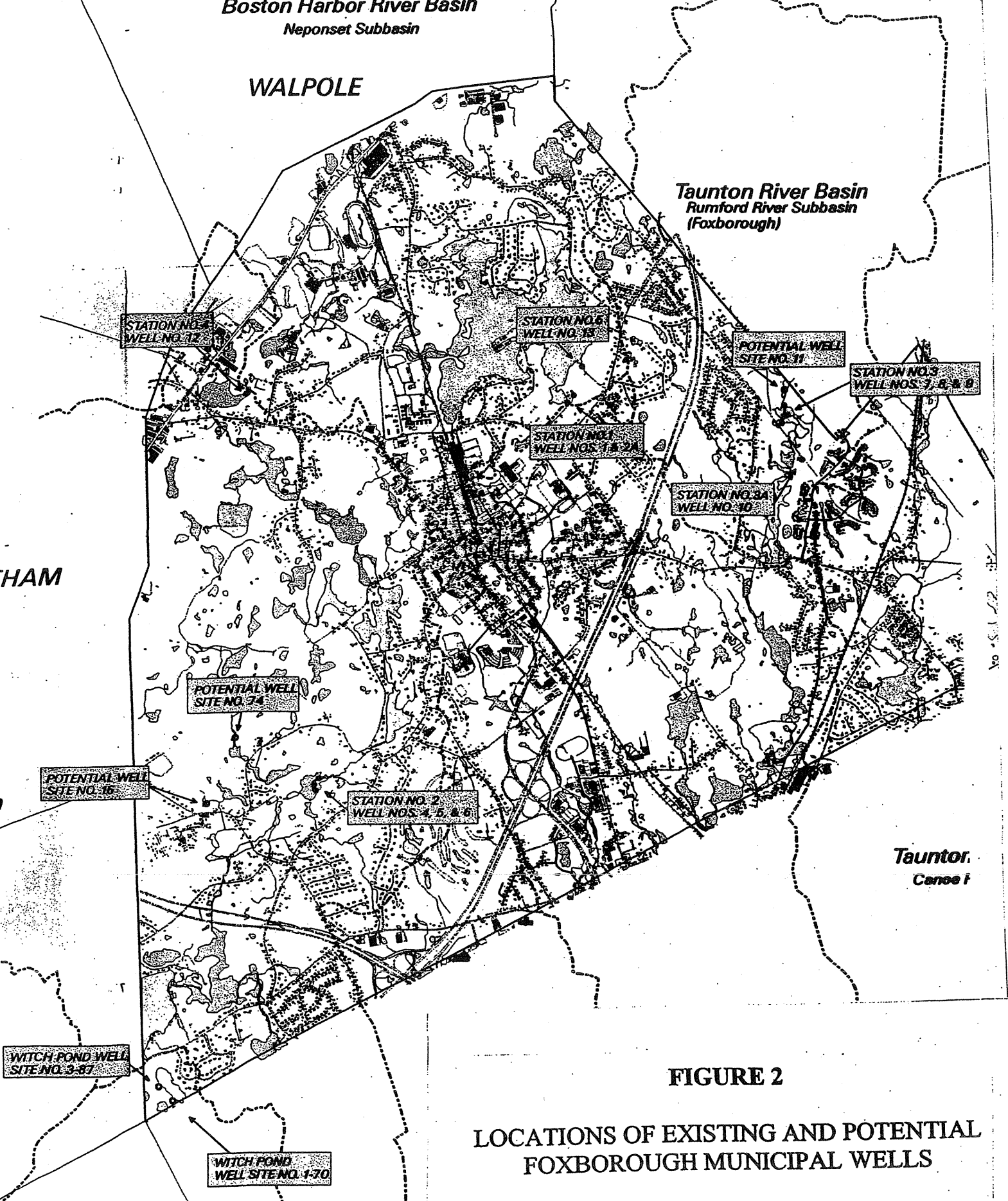


FIGURE 2

LOCATIONS OF EXISTING AND POTENTIAL FOXBOROUGH MUNICIPAL WELLS

(From Board of Water and Sewer Commissioners
IBT Application for Witch Pond Wells July, 2000)

(Hessel's Hairstreak butterfly and the spotted turtle), and development of a Local Water Resources Management Plan.

Synopsis Of The Evaluation Criteria (313 CMR 4.05)

Criteria	Application Meets?
Criterion #1: MEPA Compliance	Yes
Criterion #2: Viable In-Basin Sources	Yes
Criterion #3: Water Conservation	Conditionally
Criterion #4: Watershed Management	Not Applicable
Criterion #5: Reasonable Instream Flow	Conditionally
Criterion #6: Groundwater/Pumping Test	Yes
Criterion #7: Local Water Resources Management Plan	Conditionally
Criterion #8: Cumulative Impacts	Conditionally

MEPA COMPLIANCE

On November 25, 1991, the Secretary of Environmental Affairs issued a certificate on the ENF filed for this project, stating that an environmental impact report was not required for this project. On April 6, 1998, the Secretary of Environmental Affairs issued a certificate on the Notice of Project Change filed for this project, stating that no further MEPA review was required for this project.

At the time the application was filed, it appeared that Foxborough had complied with MEPA. However, during the public comment period, it was suggested that an additional notice of project change may be needed because the habitat of the Hessel's Hairstreak butterfly had not been identified in the Witch Pond Swamp at the time of Foxborough's previous MEPA filings. Foxborough requested an opinion on this issue from MEPA and in a letter dated August 23, 2001, MEPA replied that additional MEPA review was not needed.

VIABLE IN-BASIN SOURCES

Although the Interbasin Transfer Act is triggered because the water from these proposed wells will be discharged as wastewater across a town line, this is an interbasin transfer of water supply because the water supply crosses a basin line for use in the receiving basin. Part of the water is discharged at the Mansfield wastewater treatment plant in Norton, therefore the intratown exemption does not apply. If Foxborough discharged all of its water supply within town, this transfer would be exempt under the intratown exemption.

The Interbasin Transfer Act requires "that all reasonable efforts have been made to identify and develop all viable sources in the receiving area of the proposed interbasin transfer". Because this is a water supply transfer, Foxborough was required to make all reasonable efforts to identify

and develop all viable sources in the Taunton River basin section of town, which is the “receiving area”. Foxborough has land area in five subbasins of the Taunton River basin, as delineated in the 1991 WRC-approved Taunton River Basin Plan: Wading River at Mansfield, Wading River at Norton, Rumford River at Foxborough, Rumford River at Norton, and the Canoe River. The 1991 Basin Plan and 1997 Update identified the Wading River at Mansfield, the Rumford River at Foxborough, and the Canoe River subbasins as having no additional potential yield during a moderate drought.

Foxborough identified five (5) potential well sites in the Taunton River basin. The WRC accepts DEP’s opinion that these sites are not viable because of water quality and quantity problems. DEP has stated that two of the sites are affected by nitrate contamination. DEP has expressed concern that nitrate treatment technology is “unreliable” and does not recommend investment in this sort of water quality treatment at these sites at this time. DEP has also expressed concern that all these site have only marginal yields that limit their potential for development.

According to DEP Southeastern Regional Office, Foxborough has exhausted most, if not all, reasonable areas for further water supply development within the Taunton River Basin.

Attachment 1 gives a description of the potential well sites identified by Foxborough.

WATER CONSERVATION

Foxborough’s conservation program meets most, but not all of the 1992 Water Conservation Standards for the Commonwealth of Massachusetts and 1999 Interbasin Transfer Performance Standards. Because Foxborough’s water conservation is comprehensive in other respects, the WRC has conditioned the Decision to require that Foxborough comply with the 1999 Performance Standards before the wells are constructed. Foxborough’s accomplishments with water conservation are outlined in Attachment 1. The water conservation conditions of this Decision are listed in Section VII.

ENVIRONMENTAL ANALYSES

Description of the Proposed Withdrawal

The Town of Foxborough is proposing to construct the Witch Pond Wells in the headwaters of the Bungay Brook subbasin of the Ten Mile River basin. The two gravel-packed wells will be installed at the locations of test wells 1-70 and 3-87. Each of the proposed Witch Pond Wells has an approved safe yield of 0.72 mgd (for a total capacity of 1.44 mgd). Foxborough plans to use the water from these wells throughout the year to supplement the town’s existing municipal supply, but particularly to meet peak demands during summer months (May through September).

Foxborough currently has six existing water supply sources in other basins (**Figure 2**). DEP issued a Water Management Act (WMA) permit for the Witch Pond wells in 1993, although the permanent production wells had not been installed. The Water Management Act permit allowed a withdrawal of 0.12 mgd from these sources starting in December 2001. Foxborough has no other sources in the Ten Mile River basin. DEP recently indicated that it intends to modify

Foxborough's Ten Mile River basin WMA permit and will allow average annual withdrawals of 0.48 mgd from each of the proposed Witch Pond wells, for a total of 0.96 mgd. This use reflects the 500 gpm safe yield pumping rate applied for 16 hours per day to each of the wells.

Mansfield has approval to install an additional gravel-packed well (Morrison Well #10) approximately 600 feet north of its existing Well #6, which is approximately 2,600 feet south of the proposed Foxborough Witch Pond Wells. The Morrison Well has been permitted by the Water Management Act to withdraw 0.99 mgd. These two wells are located to the south of the proposed Foxborough Witch Pond Wells, and downstream within the Bungay Brook subbasin. The drainage area of the Foxborough well site area is approximately 0.25 square miles. Refer to Figure 1 for the Bungay Brook subbasin with the location of Mansfield's Wells #6 and #10 and Foxborough's proposed wells.

The consultants for both Foxborough and Mansfield worked together to develop a consistent characterization of the area hydrogeology. On May 25, 2000 staff met with representatives from Foxborough and Mansfield to determine whether the applications from each town would be consistent in their characterization of the area hydrogeology. The result of this meeting was assurance that the conceptual hydrogeology presented in interbasin transfer applications on behalf of both towns would be in reasonable agreement.

Description of the Site

Foxborough's proposed Witch Pond Wells are located in and on the edge of the Witch Pond Swamp (Figure 1). Bungay Brook originates in Witch Pond approximately 1,000 feet southeast of the well site. From the south end of Witch Pond, the brook flows southeastward through the Witch Pond Swamp. The surficial basin divide between the Ten Mile River and Taunton River basins does not function as a ground water divide, as there is indication that ground water flow from Lake Mirimichi in the Taunton River basin provides recharge to Witch Pond (in the Ten Mile River basin) and thereby contributes flow to Bungay Brook.

Witch Pond Swamp is perched on a peat layer of variable thickness (observed to be up to 40 feet thick on the west side of Witch Pond). The peat layer is more typically 5 to 15 feet thick in the Witch Pond Swamp. The peat layer has been observed to be increasingly compact with depth. The base of the peat layer was observed to be underlain by a low-permeability silt layer at several locations. Foxborough's Witch Pond Wells would be screened at depths between 43 and 53 feet below ground level in, and draw water from, the sand and gravel aquifer that underlies the swamp. A schematic geological cross section of the proposed well site is depicted in **Figure 3**. An Atlantic white cedar swamp exists within the Witch Pond Swamp wetlands surrounding the proposed Witch Pond Wells. This swamp serves as a unique habitat for two species protected under the Massachusetts Endangered Species Act: the spotted turtle and Hessel's Hairstreak butterfly.

The WRC was not able to identify any studies regarding the tolerance of the Atlantic white cedar swamp ecosystem to specific water level fluctuations (specifically impacts of ground water withdrawals) to be used in review of this application. However, agency personnel and

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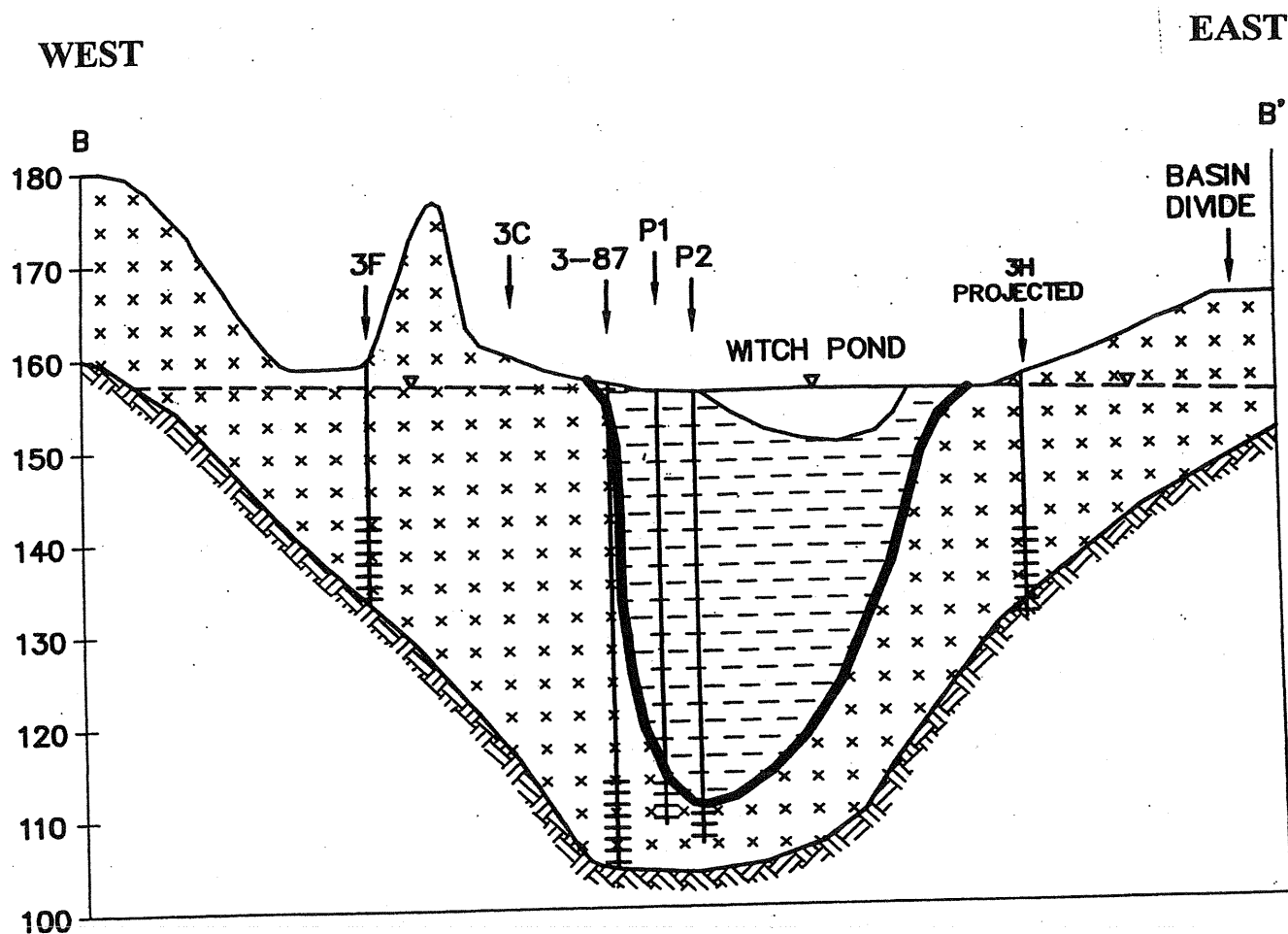


FIGURE 3

Geologic Cross Section, West to East
Foxborough Witch Pond Well Site

(Adapted from IBT Application Figure 5
Earth Tech, 2000)

SCALE

HORIZ.: 1"=300'

VERT.: 1"=20'

LEGEND

- x x x SAND & GRAVEL
- - - PEAT
- Bedrock/Till
- Silty Sand

FIGURE NO. 5
GEOLOGIC CROSS SECTION B-B'
FOXBOROUGH, MASSACHUSETTS

individuals with expertise in Atlantic white cedar in Massachusetts were consulted to ascertain the hydrologic conditions necessary to maintain the Atlantic white cedar swamp ecosystem values and functions. To maintain its habitat and to prevent invasion and dominance by other plant species, Atlantic white cedar swamps require periodic inundation and a near-surface water table. In its previous Decision for the Mansfield Morrison Well, the WRC established a compliance water level in the peat layer within one foot of the wetland hollow surface as an operating condition. This well is also located near the Atlantic white cedar swamp within the Upper Bungay Brook subbasin.

Reasonable Instream Flow Analysis

- *The exact recharge mechanisms between Lake Mirimichi, Witch Pond, and the sand and gravel aquifer are not well understood. Additional data are necessary to ascertain the seasonal patterns of ground water recharge to Witch Pond and the effects of precipitation and Lake Mirimichi levels on the interaction between ground water and surface water at the proposed well site.*
- *Aquifer water table levels near the pumping wells could be drawn down by up to 8.5 feet as a result of pumping the proposed wells. Long-term aquifer depletion is not expected at the DEP-approved pumping rates.*
- *Bungay Brook flow is dependent, in part, on the level of Witch Pond. Witch Pond and Bungay Brook could potentially be impacted by the proposed withdrawal during certain times of the year because ground water recharge from Lake Mirimichi in the Taunton River basin, which feeds Witch Pond and thus the Brook may be intercepted by the pumping wells. The wells also have a potential to induce surface water infiltration from Witch Pond.*
- *Foxborough did not quantify the magnitude of impacts to Witch Pond levels that could be caused by pumping the proposed wells. The silty layer between the sand and gravel aquifer and the peat seems to minimize hydraulic interaction between the ground water and the surface water features in most locations, however. Additionally, the wells appear to have the potential to induce ground water recharge across the basin divide by their hydraulic influence and this may be a more significant source of recharge to the wells than surface water from Witch Pond.*
- *Hydrologic monitoring and compliance thresholds can be used to limit the impacts of pumping on Witch Pond levels and their effect on Bungay Brook flow.*

The Interbasin Transfer Act regulations require that the WRC shall consider that “reasonable instream flow in the river from which the water is transferred is maintained” (313 CMR 4.05(5)). In order to assist the Commission in this determination, the applicant was required to characterize the hydrology of the area and the impacts of this proposal on that resource.

Pumping tests were conducted on 8-inch diameter test wells at the Foxborough Witch Pond Well site in accordance with DEP source approval requirements. The pumping test on Well 1-70 was conducted from October 26 through November 4, 1971 at a pumping rate of 608 gpm. The pumping test on Well 3-87 was conducted between November 3 and November 8, 1988 at a rate of 412 gpm.

In addition to the IBT application, the primary sources of hydrogeologic data for the proposed well site reviewed in support of the interbasin transfer application prepared by Earth Tech (2000 and 2001) were the pumping test reports for Well 1-70 (Whitman & Howard, Inc., 1973), Well 3-87 (Whitman & Howard, Inc., 1989), and the Zone II delineation documentation for both Wells 1-70 and 3-87 (Whitman & Howard, 1996). Data contained in Mansfield's Interbasin Transfer Application for the Morrison Well (Woodard & Curran, 1999 and 2000) were also considered in the review of conditions in the well site area.

Ground Water Model Simulations

Foxborough's consultant developed a ground water model (using MODFLOW) to simulate hydraulic conditions in the sand and gravel aquifer. The model was based on that used by Mansfield in its IBT application for the Morrison Well #10 with some adjustments. Model simulations were run under various pumping and recharge scenarios to evaluate aquifer response.

The model was used by Foxborough to simulate the impacts of pumping all of the existing and proposed area wells, including the existing and proposed Mansfield wells, simultaneously under a number of recharge and pumping scenarios. In review of this application, the WRC considered the 90-day, full-pumping, no-recharge condition depicted on Earth Tech's Figures S12 (**Figure 4**) and S13 as the reasonable worst-case condition. This simulation represents a condition of no rainfall recharge to the aquifer, but continuing recharge provided by Lake Mirimichi from the north of the Witch Pond swamp area. It should be emphasized that the water table levels depicted in these figures are those associated with the sand and gravel, rather than levels in the peat layer of the swamp. Water table response in the peat and silt layers is expected to be less than that observed in the sand and gravel aquifer as a result of their limited hydrologic communication.

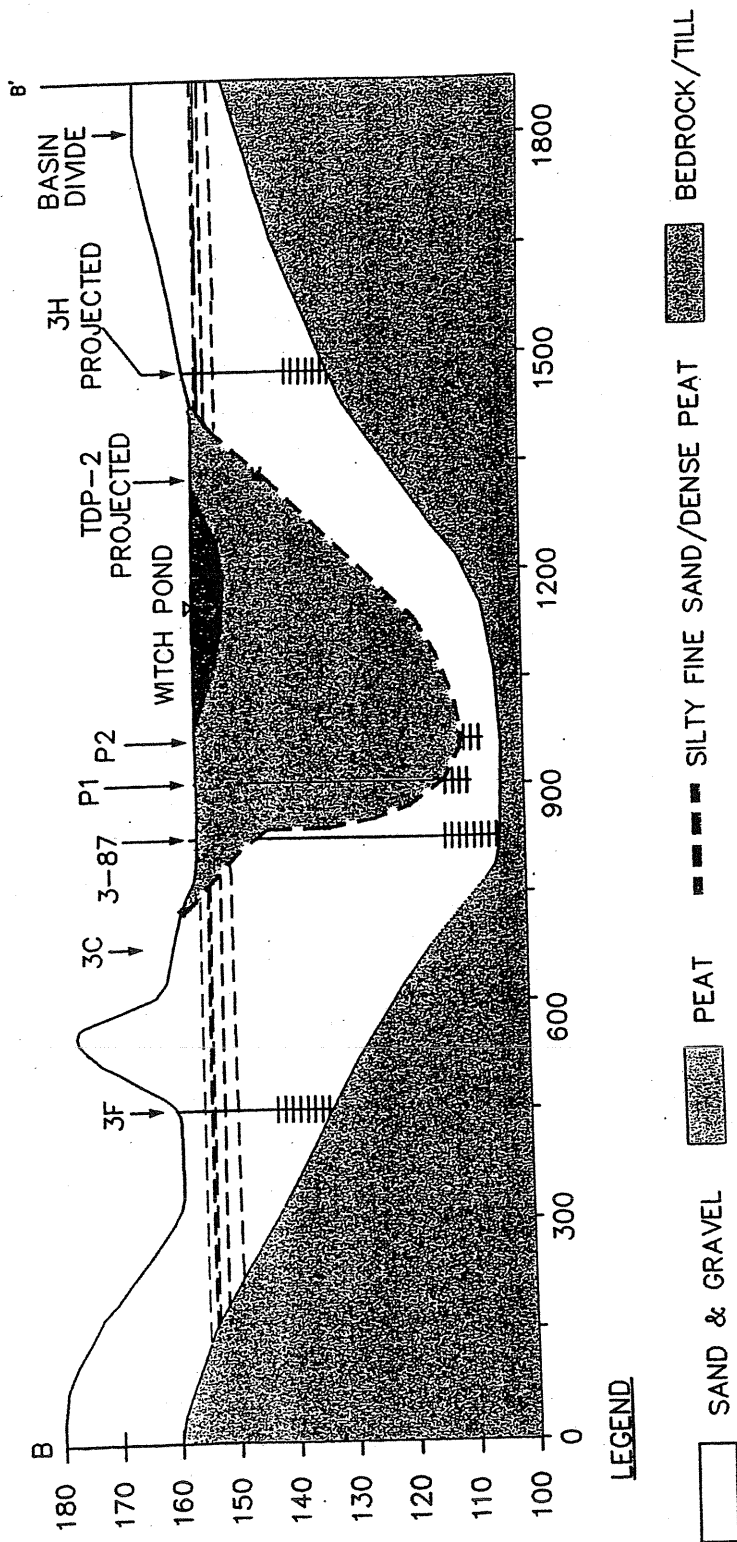
Ground Water Elevations

Selected model scenarios and resultant water table levels are summarized in **Table 1**. In the upper Bungay Brook watershed, the aquifer water table level ranges from approximately 154 to 157 feet MSL elevation under non-pumping conditions. An elevation of 155 feet MSL is used to represent the background non-pumping aquifer water table level in the proposed well area.

Because the drawdown effects of the two wells will be additive, an elongated drawdown cone will form surrounding the wells when both wells are operated together. The maximum drawdown would occur surrounding Well 3-87. The combined drawdown cone would extend beneath Witch Pond Swamp, Witch Pond, and the proposed wetland restoration area. The predicted drawdown cones under normal pumping and recharge conditions and under 90-day no-recharge conditions are depicted in **Figure 5**. These figures do not depict the maximum drawdown that would occur surrounding each of the pumping wells because the model calculates

EAST

WEST



- EXISTING WATER LEVELS IN AQUIFER WITH WELL NO. 6 PUMPING (FROM FIG. S1)
- WATER LEVELS IN AQUIFER AFTER 90 DAYS WITH NO RECHARGE, ALL WELLS PUMPING MAXIMUM (FROM FIG. S5)
- WATER LEVELS IN AQUIFER AFTER 90 DAYS WITH NO RECHARGE, FOXBORO WELLS PUMPING MAXIMUM (FROM FIG. S7)
- WATER LEVELS IN AQUIFER WITH AVERAGE RECHARGE, ALL WELLS PUMPING 2/3 MAXIMUM (FROM FIG. S7)
- WATER LEVELS IN AQUIFER WITH AVERAGE RECHARGE, FOXBORO WELLS PUMPING 2/3 MAXIMUM (FROM FIG. S9)

NOTE: WATER LEVELS ARE NOT SHOWN WITHIN PEAT AND POND UNITS BECAUSE OF MODEL LIMITATIONS

FIGURE 4

Summary of Ground Water Model Results
Foxborough Witch Pond Well Site

(Adapted from IBT Application Figure S12
EarthTech, November 2000)

Table 1. Summary of Predicted Aquifer Draw Down

Scenario	Aquifer draw down beneath wetland nearest Well 1-70 (Ft)	Aquifer water table elevation beneath wetland nearest Well 1-70 (Ft MSL)	Aquifer draw down beneath wetland nearest Well 3-87 (Ft)	Aquifer water table elevation beneath wetland nearest Well 3-87 (Ft MSL)
S1 and S2 * 90-Day No Recharge All wells Max	8	147	7	148
S7 and S8 * Average recharge All wells 2/3	2	153	1	154
Distance Drawdown Average recharge Foxborough wells Max	4.5	150.5	8.5	146.5
Distance Drawdown Average recharge Foxborough wells 2/3	3	152	6	149
Distance Drawdown Average recharge Foxborough wells 50%	2.5	152.5	4	151
Well Function 90 Days no recharge Foxborough wells Max	7.5	147.5	9.5	145.5

Note: All draw down and elevation values estimated to nearest 0.5 Foot.
Non-pumping aquifer water table elevation assumed at 155.0 Ft MSL
* = Does not depict maximum draw down associated with pumping wells
Some data based on ground water model simulations by Earth Tech.

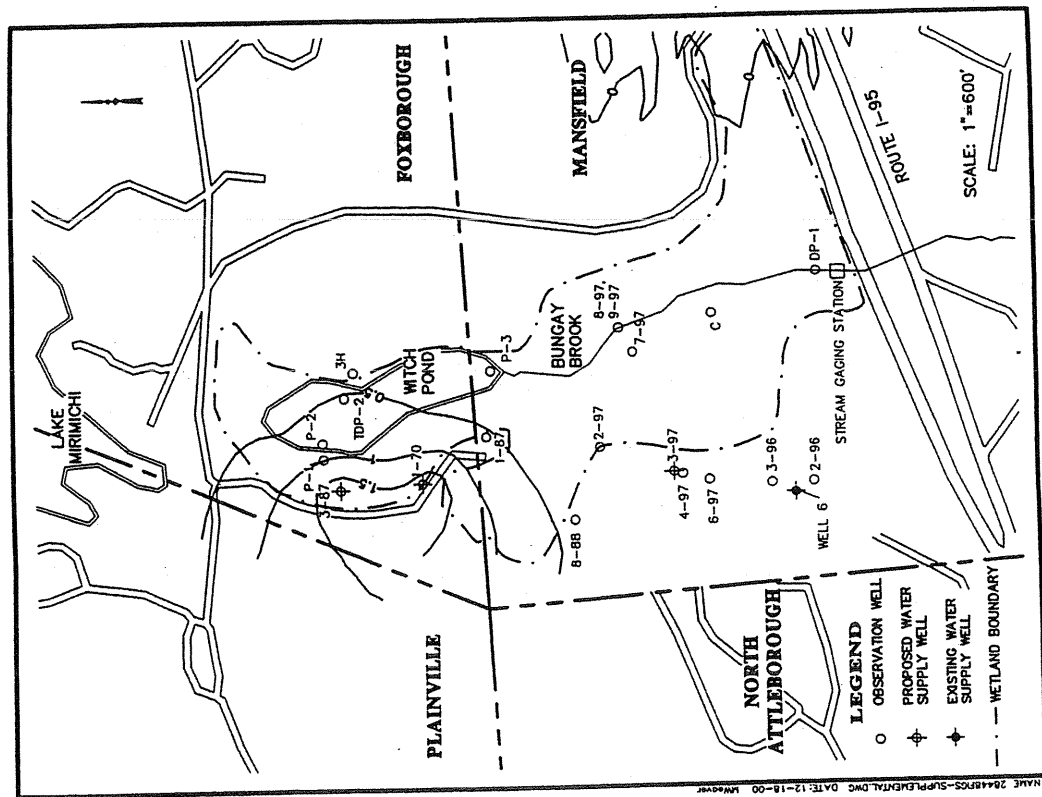
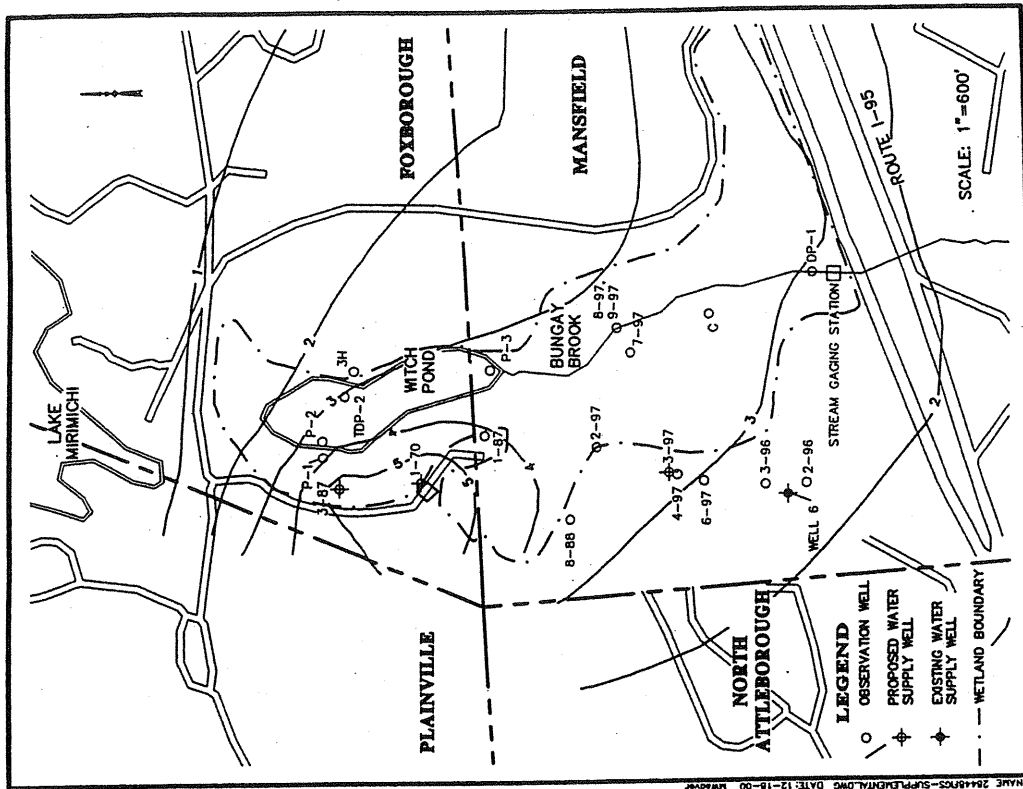


FIGURE 5

Drawdown in Aquifer Surrounding Proposed Foxborough Witch Pond Wells Under Normal Pumping Conditions and Maximum Pumping During 90-Day No-Recharge Conditions

Under Normal Pumping Conditions

and Maximum Pumping During 90-Day No-Recharge Conditions

(Based on IBT Application Figures S6 and S10, EarthTech, December 2000)

an average water table elevation for the entire 2,500 square foot grid area in which each pumping well is located. The range of aquifer drawdown values near each of the pumping wells from both the Foxborough ground water models and distance versus drawdown relationships established from the pumping tests are summarized in Table 1. Predicted drawdown in the sand and gravel aquifer would be greatest (approximately 8.5 feet with both of the Foxborough wells pumping at their maximum rates and under average recharge conditions) at a distance of 10 feet from Well 3-87. The combined drawdown in the sand and gravel aquifer at a distance of 10 feet from Well 1-70 under the same conditions is predicted to be 4.5 feet. Pumping test data indicate that these drawdowns are likely to occur within seven days of well operation. Drawdown values for other pumping scenarios are also shown on the table. Conservative drawdown was calculated near each of the proposed wells at their maximum pumping rates under 90-day no recharge conditions using the Theis well function. These values are also shown on Table 1. The Theis analyses predict maximum drawdown values of 7.5 to 9.5 feet near Wells 1-70 and 3-87, respectively. These values are consistent with the range of the worst-case conditions predicted by the MODFLOW model and the distance versus drawdown analyses.

Drawdown diminishes logarithmically with distance from the pumping wells. Due to their location within and at the immediate edge of the wetlands, the Witch Pond Wells will exert a significant hydraulic influence on the wetlands in their immediate vicinity. The potential impact of the aquifer drawdown on wetland water levels will be discussed in the following sections of this document.

Pumping test data indicated that sufficient recharge was available to stabilize the drawdown cones of both of the proposed Witch Pond Wells. This indicates that the wells are not expected to deplete aquifer storage nor cause a decline in the water table with long-term use. The actual configuration of the drawdown cones associated with the wells will vary somewhat in extent and magnitude based upon well use and recharge (precipitation) patterns, but is not expected to be significantly different than the model simulations.

Impacts to Streamflow

Due to the nature of the Witch Pond area hydrogeology, water levels in Witch Pond have a strong influence on Bungay Brook flow. The analysis of impacts to streamflow and surface water levels are addressed below.

Bungay Brook is sustained primarily by precipitation and drainage from Witch Pond. Recharge from Lake Mirimichi in the Taunton River basin appears to contribute to Witch Pond. Maintenance of the Witch Pond level is necessary to provide continuity of the current magnitude and duration of stream flow in Bungay Brook. Unlike most other New England streams, the brook does not appear to be significantly dependent on recharge from ground water along its length to sustain base flow during the summer months.

Bungay Brook flow is controlled by a bedrock formation that rises to the ground surface south of the Foxborough and Mansfield well sites near Route 95. This bedrock formation essentially constrains surface water flow. Bungay Brook originates as outflow from Witch Pond. When the

water level within the brook falls below the elevation of the downstream bedrock control (153.9 feet), flow ceases although standing water may remain within the channel. The Witch Pond Swamp and Bungay Brook operate more as a pond than as a typical wetland stream system. Therefore, flows cannot be simulated based on other New England streams.

Limited available field data suggests that there is only a very slight surface water elevation gradient in the upper Bungay Brook subbasin from the Witch Pond outlet to the bedrock control near Route 95. Witch Pond water level elevations have been measured in the narrow range of 154.09 to 154.36 feet during both wet and dry periods. Flow measured in Bungay Brook documented in the Foxborough IBT application has ranged between no flow (less than 0.01 cubic foot per second or cfs) to 1.188 cfs. Past observations indicate a surface water elevation change of only 0.2 feet between the Pond and the downstream end of the Brook over a distance of approximately 2,000 feet. Thus, maintenance of Witch Pond levels is necessary to maintain flow in Bungay Brook.

It is expected that Bungay Brook is intermittent and does not flow throughout the entire summer most years. During June 1999, a period with below-normal precipitation and high rates of evapotranspiration, standing water remained in Bungay Brook, although the brook was not flowing near the Mansfield Wells #6 and #10 sites after mid-June. During August 1999, the streambed near the Mansfield well site was reportedly dry and contained vegetation. Based on verbal reports, Bungay Brook has flowed continuously from April 2001 through July 2001.

Impacts to Surface Water

The Foxborough IBT application did not quantify the interaction between ground water and Witch Pond surface water under non-pumping and pumping conditions; however, data contained in the IBT application, pumping test reports, and the Zone II delineation for both of the proposed Foxborough wells provided information regarding surface water and ground water interaction near the well site.

Witch Pond is located approximately 180 feet east of proposed Well 3-87 and 250 feet east of proposed Well 1-70. A bathymetry (depth) study was conducted in June 1999. The results are shown in **Figure 6**. The survey indicated that the pond is on average three to four feet deep, with a pool on its north end which had a maximum depth of seven (7) feet. The bathymetry survey shows that approximately 2.8 acres along the edge of the pond are comprised of emergent and established wetland plants with a water depth of less than 0.5 feet.

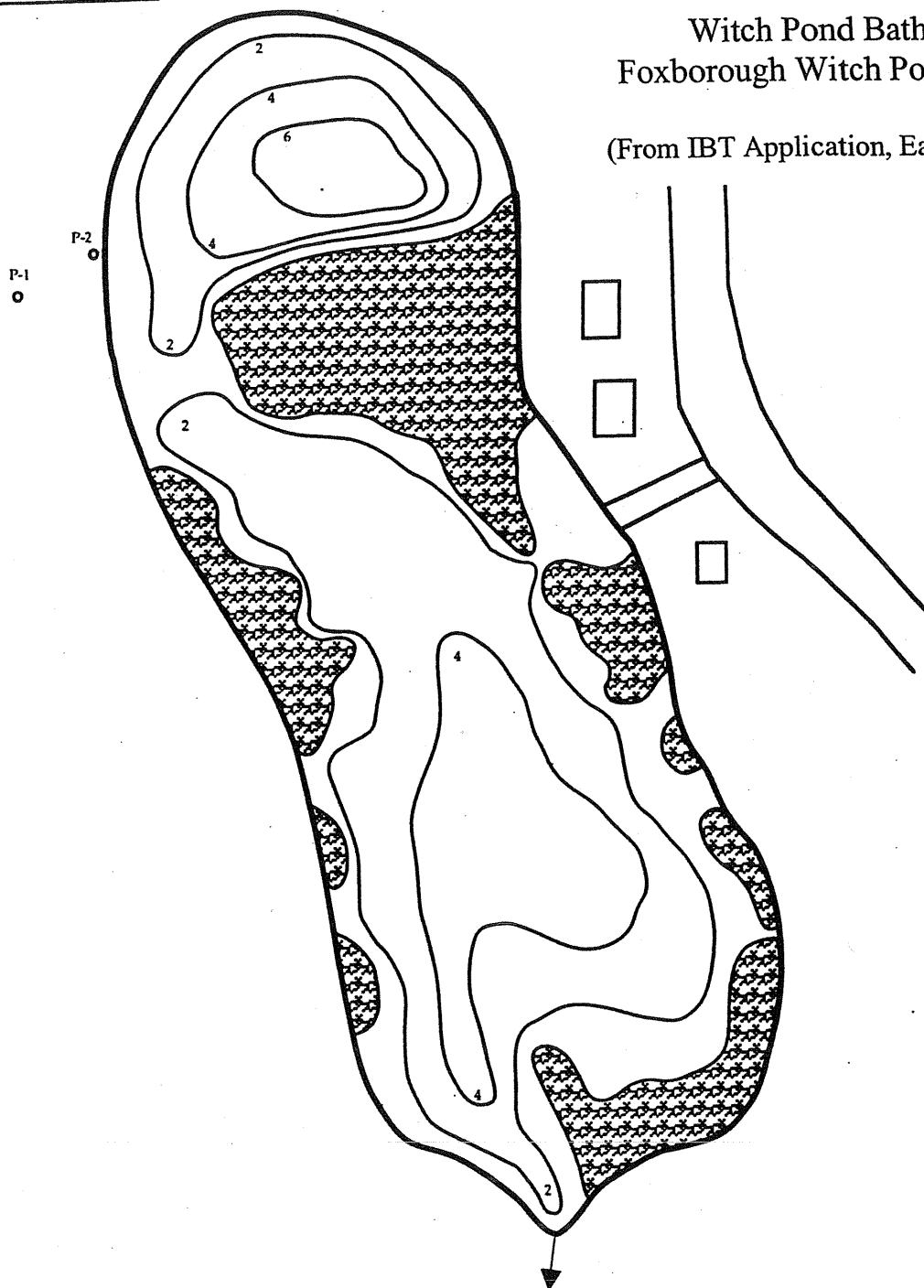
The interaction between surface water and ground water at the proposed Witch Pond well site is complex and not entirely understood. Witch Pond likely receives recharge from upward-flowing ground water at some times of the year. The rate of water transfer across the surface water/ground water interface is dependent upon the permeability of the geologic material at the interface and direction and magnitude of the hydraulic gradient that develops across the interface. The permeability and thickness of the interface materials vary spatially across the site. In areas of the upper Bungay Brook subbasin, the low-permeability sandy silt layer creates a barrier or confining layer at the surface water/ground water interface. However, since Witch Pond exists in the extreme upper end of the drainage basin as a permanent feature, it appears that

Note: All locations and dimensions are approximate

FIGURE 6

Witch Pond Bathymetry
Foxborough Witch Pond Well Site

(From IBT Application, Earth Tech, 2000)



Witch Pond

Foxboro, MA

Bathymetry Map

June, 1999

LEGEND



Emergent and established wetland plants (0-0.5 feet water depth)

Contour Interval : 2 feet



Lake Restoration

11 John Road
Sutton, MA

Scale: 1"=160'

Approximate
Pond Area = 8.8 ac

some hydraulic connection is present between the Pond and the ground water that sustains the Pond levels throughout the year. Hydraulic gradients vary spatially and temporally with seasonal recharge patterns and, under pumping conditions, will depend on the configuration of the drawdown cones that develop surrounding the wells.

Although the silty peat appears to provide a degree of hydraulic isolation between the surface water features and the aquifer, the proposed wells could cause lowering of water levels in Witch Pond either by intercepting ground water that would have otherwise recharged the pond, or by inducing infiltration from Witch Pond into the aquifer. There is an area in the southeast portion of Witch Pond that is underlain by only 2 to 5 feet of peat that may represent a potential zone where ground water and the surface water of Witch Pond interact and is not significantly restrained by low-permeability materials. The shallow zones of peat are loose and of relatively high hydraulic conductivity.

A muted pond level response to pumping was observed during the October to November 1971 pumping test on Well 1-70 and the November 1988 pumping test on Well 3-87 (as illustrated in Figure 7). These findings suggest that hydraulic isolation is present on both the east and west sides of Witch Pond swamp. The pumping test results also suggest that semi-confining aquifer conditions are present in the upper Bungay Brook subbasin, as characterized by the proponent. A delayed drainage trend was not observed in the time versus drawdown plots for the pumping tests on Wells 1-70 and 3-87, further supporting the lack of significant recharge (drainage) from the overlying sediments.

Both upward and downward vertical gradients have been observed at the proposed Witch Pond well site during past periodic measurements, suggesting that ground water recharge to the Pond is not constant in magnitude or occurrence. The occurrence and degree of ground water recharge to Witch Pond is likely dependent upon recharge (precipitation) conditions and Lake Mirimichi levels. Additional data are needed to ascertain the seasonal patterns of ground water recharge to Witch Pond and the effects of precipitation and Lake Mirimichi levels on the interaction between ground water and surface water at the proposed well site under non-pumping conditions.

Simulation of the proposed wells using the ground water model included recharge from the surface water features including the Witch Pond Swamp wetlands, Bungay Brook, and Witch Pond. Water balance data provided for the model indicated that under normal recharge conditions, the proposed Witch Pond Wells will receive approximately 20 percent or 290,000 gallons per day of their recharge from these surface water sources. The model results also indicated that when the Foxborough wells are pumping, additional water (above the amount that flows under non-pumping conditions) is induced across the basin boundary from Lake Mirimichi to recharge the wells. The amount of water that is predicted to flow across the basin divide from the Taunton River basin is even greater under the 90-day no rainfall recharge condition. If this relationship is correct, it implies that the wells may preferentially receive recharge from the larger Lake Mirimichi in the Taunton River basin and minimize the impacts on Witch Pond and the Witch Pond swamp wetlands.

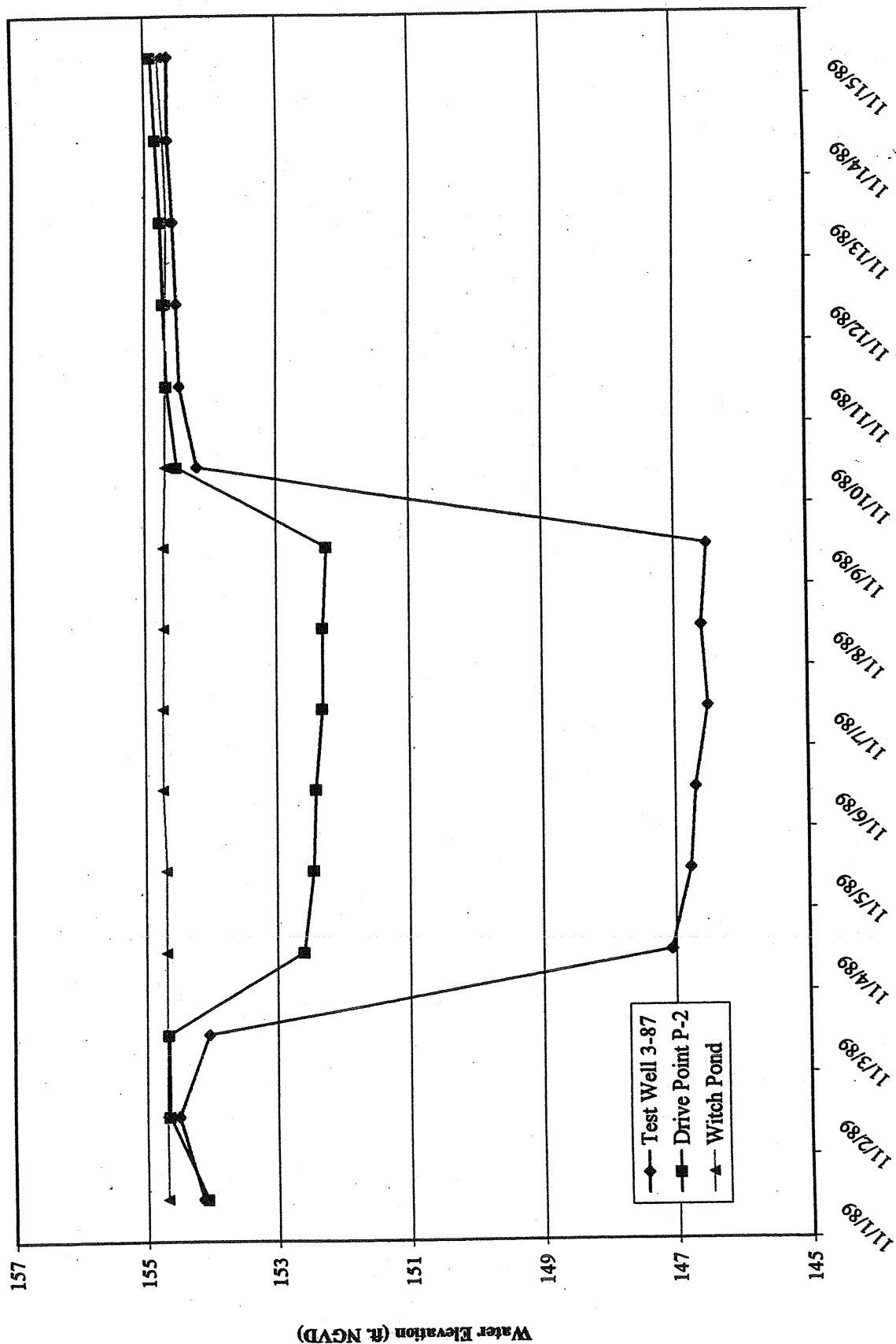


Figure 7

Water Level Response during 1988 Pumping Test on Well 3-87
Foxborough Witch Pond Well Site

(From IBT Application Figure 10, Earth Tech, 2000)

Streamflow Dependent Ecosystems Analyses

The following conclusions were drawn regarding the Witch Pond Wells' effect on streamflow-dependent ecosystems:

- *Because of the wells' proximity to the Atlantic white cedar swamp, Witch Pond, and the wetland restoration area, the proposed Witch Pond Wells may have hydraulic influence on the surrounding wetlands. Seasonal inundation will continue to occur as a result of local precipitation. The effects of drawdown will be most pronounced immediately surrounding the wells.*
- *Witch Pond is in the vicinity of known occurrences of the spotted turtle and therefore likely serves as habitat for both fish and the protected spotted turtle.*
- *Pumping the proposed Witch Pond Wells will cause significant drawdown in the sand and gravel aquifer beneath the wetlands immediately surrounding the pumping wells; however, low-permeability silt and peat layers appear to limit the hydraulic connection between surface water features and the lower sand and gravel aquifer near the proposed Witch Pond Wells site. A significant degree of hydraulic separation appears to exist between the ground water in the shallow peat and the sand and gravel aquifer that will buffer impacts to the wetlands.*
- *Impacts of the proposed Witch Pond Wells on other uses do not appear to be significant and can be controlled to protect environmental resources.*
- *A monitoring program can be used to verify expected conditions at the Witch Pond Wells site. Threshold water table levels can be used to control impacts of pumping on nearby surface water resources. Use of the wells may need to be curtailed during the summer months when the thresholds are applied.*

In addition to maintenance of a reasonable instream flow, the regulations (313 CMR 4.05(5)) require the Commission to consider other streamflow dependent ecosystems and water uses when evaluating the impacts of a proposed Interbasin Transfer. Among these uses are: the effect on ground water and surface water elevations, the significance of wetlands and dependent flora and fauna and effects of the withdrawal thereon, the effect on other water withdrawals and undeveloped rights within the donor basin, and effect on other instream uses.¹ The effect on ground water and surface water elevations was described in the previous section.

¹ The complete list of the uses to be considered is found in the Interbasin Transfer Act regulations, 313 CMR 4.05(5).

Impacts to Wetlands and Dependent Flora and Fauna

Hessel's Hairstreak, a rare and endangered species, is present in the Witch Pond swamp. This species is obligate to the Atlantic white cedar ecosystem, making water level impacts that would alter the hydrologic characteristics of the swamp and allow invasive species to overtake the wetland unacceptable at this site. The general hydrologic requirements of the Atlantic white cedar swamp surrounding the proposed wells include periodic inundation and near-surface water table conditions. Seasonal inundation precludes invasion by red maple and other species that are intolerant of wet conditions. Seasonal inundation is dependent upon precipitation events and should not be significantly influenced by the proposed wells. Maintenance of near-surface water levels must be assured to maintain the Atlantic white cedar swamp in its natural state.

The Atlantic white cedar swamp is clearly within the zone of influence (drawdown cone) which will be generated from both of the proposed wells. The immediate proximity of the proposed Witch Pond wells leads to concerns regarding their potential impacts to water levels in the peat layer supporting the Atlantic white cedar swamp. Well 1-70 is located along the western edge of the Atlantic white cedar swamp. Well 3-87 is located approximately 100 feet east of the Atlantic white cedar swamp edge (within the swamp) and approximately 200 feet west of Witch Pond. Foxborough obtained an Order of Conditions for the well site work that included a wetland restoration area. The wetland restoration area is located south of the proposed wells and extends from approximately 150 feet south of Well 1-70 to the Foxborough/Mansfield Town line. The restoration area will replace a dirt road that had been constructed on the west side of the Witch Pond swamp. The applicant has initiated construction of roads to facilitate access to each of the pumping wells. The wetlands adjacent to the pumping wells will be filled to construct 20-foot wide access roads to the wells. Because the wetlands immediately surrounding each of the wells will be filled, it is estimated that drawdown effects from the wells will be exerted on wetlands that begin at a distance of approximately 10 feet from the wells.

Fisheries data for Witch Pond are not available, however it appears that Witch Pond supports warm water fish species. Discussions with the Division of Fisheries and Wildlife indicated that natural water levels and/or stream flow patterns should not be interrupted, particularly during spawning and incubation periods, which would occur in the springtime (through June). There is also concern about water level declines during the summer months, which would decrease the amount of habitat in the pond, and during the winter months, which could cause the shallow pond water to freeze throughout its depth and kill fish attempting to overwinter in the pond.

In addition to fish species, the pond likely serves as habitat to the spotted turtle, a species of special concern. The turtles most likely use Witch Pond as habitat where they spend nights and warm summer days. Adult spotted turtles feed exclusively while submerged under water. Therefore, maintenance of the pond water levels and area is important to maintain habitat for the spotted turtle.

In its application, Foxborough stated that "although significant drawdown of aquifer levels is apparent, the wetlands and pond will be buffered from this impact by the confining unit underlying the wetland." Although there is a lack of quantitative empirical data to fully support this conclusion, especially in the immediate vicinity of the pumping wells where the maximum

drawdown will occur and likely be sustained for long periods of time during well operation, the WRC believes this conclusion is generally supported by data from both the Foxborough and Mansfield well sites and can be verified during well operation. Impacts to the shallow water table within the peat layer of the Atlantic white cedar swamp system could be minimal based on the hydraulic separation between the aquifer and the shallow surface water system observed during pumping tests in Foxborough and Mansfield. Observations of wetland water level response were not made during the pumping tests on Wells 1-70 and 3-87; however, observations of surface water response were made at Witch Pond during the pumping test on Well 3-87 at a distance of approximately 180 feet from the pumping well. The response of the pond level at this distance may not be representative of the long-term impacts (dewatering) in the peat formation that could occur in the wetlands that immediately surround the two proposed pumping wells over a long period of well operation.

The impacts of pumping the Witch Pond Wells on shallow water table levels were evaluated. The evaluation focused on the Atlantic white cedar swamp and Witch Pond, because impacts from the proposed Foxborough wells would be most pronounced on these local features due to their close proximity. The silt and peat layers are expected to limit the hydraulic connection between the wetland and the lower sand and gravel aquifer near the proposed Witch Pond Wells site. Foxborough has suggested that during high water periods, excess ground water may seep upward and over the confining layer around the edges of the wetland; conversely, during low water conditions, the surface water is limited to slow leakage rates through the confining silty sand layer. Foxborough contends that the downward leakage rate is outpaced by precipitation events that continue to replenish surface water features.

Impacts to wetlands and dependent flora and fauna as a result of the proposed withdrawal can be minimized if hydraulic gradients that develop between the peat and the aquifer are limited by implementation of regulatory water level thresholds. Well use would be curtailed when water level thresholds are approached and ceased when the thresholds are met. If Foxborough's conclusion regarding water level impacts in the swamp is incorrect and unacceptable conditions develop in the wetlands or in Witch Pond as a result of pumping, the Town would have to cease well operations. The risk of these conditions occurring is greatest during the summer months, when evapotranspiration can essentially preclude aquifer recharge and the water system demands will be the greatest. **Foxborough should consider conducting additional pumping tests to verify the hydraulic response between the aquifer and the wetland near the pumping wells, prior to committing to site construction.**

A comprehensive monitoring plan is appropriate at this site to verify the expected water levels and to assess and control any unexpected negative impacts of the withdrawal on the Atlantic white cedar swamp habitat, Witch Pond, and Bungay Brook. Baseline (pre-pumping) and operational monitoring should be performed to verify that seasonal inundation occurs within the Atlantic white cedar swamp adjacent to the Witch Pond Wells, that the water level in the peat remains near the wetland surface, that Witch Pond levels are not significantly affected by pumping, that invasive species are not increasing, and that vegetative species that represent sources of nectar to Hessel's Hairstreak butterfly remain intact. Monitoring wells at the edge of the Atlantic white cedar swamp closest to the pumping wells should be screened in both the

shallow and base peat layers and in the lower sand and gravel aquifer to verify the water levels predicted by the model and the range of drawdown in each of the geologic layers.

Thresholds

Threshold water table elevations are required to assure protection of the area's sensitive resources and to verify expectations concerning impacts. The threshold elevations will be used to control the operation of the Witch Pond Wells. In the event that any one of the thresholds is exceeded (i.e., the water level elevation falls below the threshold), well use will be discontinued until the water table elevation is restored and maintained above the threshold. The WRC will require a monitoring plan be developed which includes a program for reducing withdrawals from the Witch Pond Wells when water levels approach these thresholds and which will allow a recovery period after the thresholds are reached.

A threshold water table elevation of 154.00 feet NGVD is required for *the peat layer*. This level is intended to keep water within one foot of the wetland hollow surface, as indicated by Atlantic White Cedar Swamp experts as being within the range necessary to maintain the ecosystem. This level will be monitored in both the shallow and deep peat layers at three locations, one at the edge of the Atlantic white cedar swamp nearest to each of the Witch Pond wells, and one at the nearest edge of the wetland restoration area. Monitoring the deep peat layer is intended to allow observation of potential drying from the base of the peat layer as a result of hydraulic influence from the underlying aquifer. The peat may be subject to desiccation and compaction if continual dewatering occurs.

It is recognized that the water level in the peat may naturally decline to more than one foot below the hollow surface during periods of the summer months. The WRC requires that pumping be curtailed during these dry periods and additional data be collected that more thoroughly describe the natural range of water level fluctuation in the peat layer and the response of peat ground water to precipitation events and pumping influences.

A background observation well should be established to document water level changes in the wetland shallow peat layer in a location within the Atlantic white cedar swamp that is least affected by pumping the Foxborough and Mansfield wells. Observations at this background well will be used to determine whether water level fluctuations observed at the compliance observation wells are caused by pumping or by natural conditions that affect the general well site area.

A threshold level of 148.00 feet NGVD is required for *the aquifer* at two locations, at the edge of the Atlantic white cedar swamp nearest to each of the Witch Pond Wells (i.e., one at the edge of each well's access road). This level is below the elevation modeled by the applicant to include all wells operating at normal rates (2/3 pumping rate or full pumping rate for 16 hours per day, or the operating schedule proposed in pages 3 and 4 of the application) under normal recharge conditions. This threshold level should be attainable during normal recharge conditions and normal well operation. It is expected that this threshold level may be exceeded during a 90-day period of no recharge, which may occur during summer months. The threshold would not be as likely to be reached if Foxborough were using the wells at less than their maximum capacity (i.e., for less than 24 hours a day). It appears that Well 3-87 may be more subject to shutoff than

Well 1-70. If the threshold is reached at a monitoring location associated with a pumping well, that well will be shut off. Either pumping well could be operated alone until the threshold is reached at its monitoring well. Maintenance of the aquifer water level at this elevation will limit the hydraulic influence of pumping from the sand and gravel aquifer on the Atlantic white cedar wetland and Witch Pond.

A threshold level of 151.00 feet NGVD is required for *the aquifer adjacent to Witch Pond*.

This threshold will be applied at the Witch Pond shoreline nearest to Well 3-87 and limit the downward vertical gradient that develops between the aquifer and the pond. This level should be attainable under all pumping and recharge conditions with the exception of the 90-day no-recharge scenario based on model simulations.

A threshold level of 154.20 feet NGVD is required for *the surface water level at Witch Pond*.

This elevation will protect the pond from being lowered as a result of induced infiltration caused by pumping from the sand and gravel aquifer or from a loss of ground water recharge intercepted by the pumping wells. The level was selected to limit pond level decline to that previously observed at the site during June 1999 when Bungay Brook flow declined to 0.1 cfs. This level will limit the duration of time that Bungay Brook is not flowing by preventing the extension of those periods that may be caused by pumping influences. Although the brook is suspected to be intermittent in the absence of the Foxborough wells, there is very little data available regarding the relationship of the pond level and brook flow. It is expected that the brook and pond will respond to precipitation events and that the threshold level will be reached only during periods with less than normal precipitation.

The threshold levels specified above are recommended for use by DEP as compliance levels in association with the Town's Water Management Act permit for the Witch Pond Wells. It is expected that the threshold levels may be exceeded during a 90-day period of no rainfall recharge, which may occur during summer months. This will result in use of the wells being curtailed until water levels have recovered. The thresholds are not as likely to be reached if Foxborough uses the Witch Pond wells at less than their maximum capacity (i.e., for less than 24 hours a day). The levels were selected to represent acceptable hydraulic conditions that maintain and protect the wetland and surface water values of Witch Pond Swamp, the Atlantic white cedar swamp, and Witch Pond and its outflow to Bungay Brook and are consistent with the projected configuration of the water table levels associated with use of all of the public water supply wells in the site area that was included in the application for this project. It is expected that seasonal inundation in the wetlands will continue with the use of the Witch Pond Wells, the water levels in Witch Pond will be maintained, and the water levels in the wetlands will undergo the normal range of seasonal variation. During the baseline monitoring period and the first five years of well operation, the threshold levels and the period and levels of seasonal inundation will be used to verify the expected hydrologic responses to pumping in the various geologic layers. Following review of data collected during the baseline year and first five years of well operation, adjustment of the threshold levels and/or the well usage may be appropriate.

Impact on Other Water Users

The applicant evaluated impacts of the proposed withdrawal on other users including the existing and proposed Mansfield wells, North Attleborough National Salmon Fish Hatchery wells, and recreational uses of Greenwood Lake. Impacts of the proposed Witch Pond Wells on the other uses do not appear to be significant. Interference between the two Foxborough Witch Pond wells is expected because of the wells' proximity, but Foxborough can manage the operation of the two wells to minimize interference effects and to minimize the frequency of encountering thresholds.

The impact of the Foxborough Witch Pond Wells on Mansfield Wells #6 and #10 is expected to be minimal under normal operating and recharge conditions. Approximately two to three feet of aquifer drawdown at the Mansfield wells, attributable to pumping the proposed Foxborough wells 1-70 and 3-87 at full capacity, was simulated at the end of a 90-day no-recharge period. Likewise, the Mansfield wells could cause interference of one to two feet on the Foxborough wells after 90 days of pumping at full capacity without recharge. However, with use of water level thresholds at the each of the well fields, these impacts are not likely to be realized. It is expected that use of both towns' well fields may be curtailed during dry periods.

Greenwood Lake levels are reportedly controlled by the Fish Hatchery and impacts from the proposed ground water withdrawals would be insignificant in comparison.

LOCAL WATER RESOURCES MANAGEMENT PLAN

Because Foxborough's Interbasin Transfer application was received after adoption of the Performance Standards, it is subject to the new definition of a Local Water Resources Management Plan. Foxborough has taken a forward looking view in planning and managing its water resources. The town is in the process of developing a Comprehensive Water Resources Management Plan (CWRMP), according to the DEP guidelines. However, the Town does not have a consolidated Local Water Resources Management Plan, as outlined in the Performance Standards. Most of the various components have been completed, but these need to be analyzed and summarized. The conclusions of the existing plans need to be integrated, in the context of the WRC's definition, into a statement of the future direction of water and wastewater resource use and management for the Town. If the CWRMP under development meets the WRC's guidelines, this may be able to be substituted for a Local Water Resources Management Plan. Otherwise, it can be used as a component of the plan.

The Interbasin Transfer regulations, 313 CMR 4.05(7) state that a community requesting approval for an Interbasin Transfer must "have adopted or (be) actively engaged in developing a local water resources management plan." The WRC approved this application after Foxborough committed to completing a local water resources management plan as described in the 1999 Performance Standards.

CONDITIONS OF THE DECISION

Based on the analyses and concerns expressed about this proposal, the WRC's required that Foxborough commit in writing to meeting the following conditions. **These conditions, unless otherwise specified, must be met before the Witch Pond Wells are installed (i.e., before the wells are drilled).** In addition, Foxborough must agree to abide by all other permits issued for this well.

In order to fully comply with Criterion #3, that all practical measures to conserve water have been taken in the receiving area:

1. Foxborough must conduct a town-wide leak detection survey. The report for this survey, together with documentation of the leaks found and repaired, must be provided to the WRC. This must occur before the wells are installed.
2. Foxborough must continue to perform town-wide leak detection surveys every two years, as required by its 1993 Water Management Act permit. Records of leaks found and repaired must be maintained and made available to WRC staff upon request for two years after completion of each survey. Regular reporting on the leak detection surveys should be carried out in accordance with the Water Management Act permit. This is an ongoing condition.
3. Foxborough must provide documentation that the Ahern School has been retrofit with water saving devices before the wells are installed.
4. Foxborough must retrofit the High School, Taylor School and Burrell School with water saving devices, as required by their 1991 Water Management Act Permit. Documentation that this has been completed must be furnished to the WRC before the wells can be installed.
5. The town must conduct a water audit of its water supply system, including public facilities, and furnish the water audit report to the WRC. This must occur before the wells are installed.
6. Foxborough must commit to conducting a water audit of its system biannually, as required by their 1991 Water Management Act Permit. This is an ongoing condition.
7. Foxborough must implement a comprehensive residential conservation program as long as residential gpcd is above 65. The program should include a toilet retrofit, rebate or other similarly effective program for encouraging installation of household water saving devices, including faucet aerators, showerheads and toilets and through efforts to reduce excessive outdoor water use. A plan for this program shall be provided to the WRC before the wells are installed. Foxborough must submit a copy of its Public Water Supply Annual Statistical Report (required by DEP) to the WRC annually, for the first five years after the Witch Pond Wells are operational, to demonstrate the continued effectiveness of the comprehensive residential conservation program. This is an ongoing condition.
8. Foxborough must continue its program to aggressively promote conservation by its industrial, commercial and institutional water users. This program should include regular contact with these users to promote water conservation. This is an ongoing condition.
9. Before the wells are installed, Foxborough must provide a plan for WRC review and approval, to reduce and maintain its unaccounted-for water to 10% or lower. Foxborough must submit a copy of its Public Water Supply Annual Statistical Report (required by DEP) to the WRC annually, for the first five years after the Witch Pond Wells are operational, to demonstrate the continued effectiveness of the unaccounted-for water reduction program.

10. The plans required by the conditions under this Criterion must be incorporated into Foxborough's long-term Water Conservation Plan.

In order to fully comply with Criterion #5, that reasonable instream flow in the river from which the water is transferred is maintained (environmental impacts):

1. Foxborough will operate these wells in accordance with the DEP approved maximum daily withdrawal rates of 0.72 mgd for Well 1-70 and 0.72 mgd for Well 3-87 which limits total combined pumpage to 1.44 mgd and in accordance with its revised Water Management Act permit.
2. Foxborough must develop a monitoring plan to assure that withdrawals from the Witch Pond Wells will not adversely impact the habitat of the Hessel's Hairstreak butterfly, the spotted turtle, the Atlantic white cedar swamp, Witch Pond, and Bungay Brook. The monitoring plan must be approved by the appropriate state agencies and the WRC before the wells are installed. Results of monitoring must be reported to WRC staff, NHESP and DEP, in accordance with the approved monitoring plan, for their review and assessment. Following review of the one-year baseline period report, Foxborough may propose revisions to the operating period monitoring plan (subject to agency review and approval). Foxborough shall perform operational monitoring for as long as the Witch Pond Wells are used as a public water supply source.
3. This monitoring plan must be submitted to the Natural Heritage and Endangered Species Program (NHESP), DEP and WRC staff. Elements of the plan must include the following items, at a minimum. Specific details, additional monitoring parameters, observation locations, and monitoring schedule should be established by a hydrogeologist and a wetlands expert on behalf of the Town, in conjunction with discussions with the appropriate agencies and WRC staff.
 - One year of baseline monitoring for both wetland vegetation and hydrology.
 - Continuous daily water level monitoring in the swamp, in the underlying aquifer and in Witch Pond at the compliance (threshold) monitoring points and at an ambient well location during a one-year baseline period prior to well operation and during operation of the Witch Pond Wells to verify the hydrologic conditions modeled in the application and to verify that the water table in the Atlantic white cedar swamp is not drawn down for increased frequency and duration beyond the amount occurring in areas unaffected by the wells.
 - Wetland vegetation monitoring to assure that invasive species are not increasing in proportion near the Witch Pond Wells and that species which represent nectar sources to the Hessel's Hairstreak are not affected by pumping.
 - Daily precipitation monitoring including rainfall and frozen precipitation reported as water equivalent.
 - Monitoring of Lake Mirimichi, Witch Pond, and Bungay Brook levels.
 - A report shall be prepared at the conclusion of the baseline monitoring period and prior to initiating the use of the Witch Pond Wells and submitted to NHESP, DEP and WRC staff.
4. Foxborough shall provide access and allow agency personnel (or delegated parties) to inspect the well site to verify conditions of this approval. This is an ongoing condition.
5. As part of the monitoring program, Foxborough must operate the wells in a manner that assures that water table elevation in the shallow peat in the Atlantic white cedar swamp

nearest the Witch Pond Wells shall be maintained above a level of 154.00 feet NGVD. The water level in the underlying aquifer adjacent to the Atlantic white cedar swamp at the Foxborough Witch Pond wells must be maintained above 148.00 feet NGVD. The water level in the aquifer adjacent to Witch Pond shall be maintained above an elevation of 151.00 feet. The water level in Witch Pond must be maintained above or at an elevation of 154.20 feet NGVD. Alternative compliance levels may be proposed by the applicant following the first five years of well operation if it can be demonstrated that alternative levels are protective of the sensitive resources in the Witch Pond Wells area. This is an ongoing condition.

6. Annual reports of water level elevations and pumpage shall be furnished to the WRC and NHESP for review. This is an ongoing condition. If alteration of the habitat or evidence of increasing invasive species in the Atlantic white cedar swamp above the trend observed in control sites is found and can be related to use of the well, or impacts to Witch Pond levels or flow in Bungay Brook occur, pumpage of the Witch Pond Wells may be restricted accordingly.
7. Foxborough must commit to abiding by any restrictions that may be placed on the use of the Witch Pond Wells as a result of monitoring.

Because each town's wells are sited in the same aquifer and swamp system, it is strongly suggested that Foxborough and Mansfield work cooperatively on their respective monitoring programs and share data.

In order to fully comply with Criterion #7, that the community has adopted or are actively engaged in developing a local water resources management plan:

1. Foxborough must submit a timeline for completion and scope of the local water resources management plan it needs to develop (as described in Section VI of this document) for WRC review and comment before the wells can be installed. The timeline should include the dates that the draft and final reports will be submitted to the WRC for review, comment and approval.
2. The plan must conform with the local water resources management plan outline found in Appendix B of the Interbasin Transfer Act Performance Standards, approved by the WRC in August 1999.
3. Foxborough must submit the final draft of the local water resources management plan to the WRC for approval in accordance with the approved timeline.

In order to fully comply with Criterion #8, the Commission shall consider the impacts of all past, authorized or proposed transfers in the donor basin:

1. Foxborough must commit to abiding by any restrictions that may be placed on the use of the Witch Pond Wells as a result of monitoring.

EO 385

This decision is consistent with Executive Order 385, which has the dual objective of resource protection and sustainable development. The decision does not encourage growth without

adequate infrastructure, nor does it cause an unavoidable loss of environmental quality or resources.

ATTACHMENT 1

INTERBASIN TRANSFER ACT CRITERIA FOR EVALUATING AN APPLICATION BY THE TOWN OF FOXBOROUGH FOR THE PROPOSED WITCH POND WELLS

CRITERION #1: An environmental review pursuant to MGL, c. 30, §§ 61 and 62H, inclusive has been complied with for the proposed IBT.

- On November 25, 1991, the Secretary of Environmental Affairs issued a certificate on the ENF filed for this project, stating that an environmental impact report was not required for this project.
- On April 6, 1998, the Secretary of Environmental Affairs issued a certificate on the Notice of Project Change filed for this project, stating that no further MEPA review was required for this project.
- Foxborough was directed to address the issue of an additional Notice of Project Change which was raised during the public comment period.
- In a letter dated August 23, 2001, MEPA stated that additional MEPA review was not needed.

CRITERION #2: All reasonable efforts have been made to identify and develop all viable sources in the receiving area.

The WRC performance standard for a water supply source directs a proponent to discuss the water supply alternatives considered, but rejected. Reason for the rejection of these alternatives should be clearly stated. This information should be included as part of the Local Water Resources Management Plan required under Criterion #7. In addition, as stated in the regulations, a local source must not cause unacceptable environmental damage.

The following potential well sites were identified by Foxborough:

- **Daniels Well:** A pumping test report completed in 1968 estimated that a permanent production well at this site could yield 500 gpm (0.7 mgd). This site is in the Wading River at Mansfield subbasin of the Taunton River Basin. DEP states that wetlands impacts could severely limit the projected yield and cites water quality (nitrate) concerns at this site.
- **Mill Street Test Wells:** Preliminary test well work conducted in 1973 and 1974 estimated that a permanent production well at this site could yield 350 gpm (0.5 mgd). It was recommended that additional testing be conducted prior to

considering the development of a permanent supply source at this site. This site is in the Wading River at Mansfield subbasin of the Taunton River Basin. According to DEP, the shallow ground water depth make it unlikely that it would produce sufficient yield to support a public water supply source.

- **Oak Street – Future Well #11:** Estimated safe yield from this site is 350 gpm (0.5 mgd). This site is in the Rumford River at Foxborough subbasin of the Taunton River Basin. This aquifer is used by the Town of Sharon and Foxborough's Wells #7, #8, #9 and #10. DEP states that any additional withdrawal from this location would likely intercept water currently recharging the Foxborough Wells, thereby resulting in no net increase in water supply.
- **Test Wells 18 and 20:** A 1973 report on test well work and prolonged pumping tests identified two (2) potential wells sites at this location, with estimated yields of 700 gpm (1 mgd) and 300 gpm (0.4 mgd). This site is in the Wading River at Mansfield subbasin of the Taunton River Basin. The town cites water quality concerns due to elevated nitrate levels from groundwater disposal at an upgradient campground. DEP concurs with this assessment and cites similar problems with developing this site as with the Daniel Street site.

CRITERION #3: All practical measures to conserve water have been taken in the receiving area...

For a water supply transfer, the WRC performance standards require:

- 1) A full leak detection survey should have been completed within the previous two years of the application. The proponent should provide documentation regarding repair of leaks identified during the survey. Leak detection surveys should be carried out in accordance with the MWRA's leak detection regulations (360 CMR 12.00).
 - Foxborough owns leak detection equipment and conducts ongoing surveys of portions of its system. The last time Foxborough conducted a town-wide leak detection survey was 1991.
 - Surveys are carried out in a manner similar to the MWRA's leak detection regulations
- 2) The water supply system should be 100% metered, including public facilities served by the proponent. A program of meter repair and/or replacement must be in place. Documentation of annual calibration of master meters and a description of the calibration program should be included in the application.
 - Foxborough's water supply system is 100% metered.
 - Master meters are tested and repaired annually and replaced or replaced as necessary.
 - The town is completing a service meter replacement program. This program includes regular maintenance, testing, calibration, repair and/or replacement, and inspections for tampering. The program was conducted in six phases. The final phase is expected to be completed this year (2001). The town states that this is an ongoing program.

- 3) Unaccounted-for water should be 10% or less. The proponent should provide documentation of unaccounted-for water, in both gallons and percentage of the total water pumped and withdrawn, for each of the past five years. The definition of accounted-for and unaccounted-for water for use in Interbasin Transfer applications is given in Appendix C of the Performance Standards. The plan by which the community intends to maintain or reduce this level should be included in the water resources management plan required under Criterion #7.
- *Unaccounted-for water was 7% in 1999; in 1998, it was 12.4%; in 1997, it was 18%; in 1996, it was 1.6%; in 1995 it was 14.9 %. The five year average was 11%.²*
- 4) The proponent should provide documentation to show that there are sufficient sources of funding to maintain the system, including covering the costs of operation, proper maintenance, proposed capital improvements, and water conservation. The rate structure must encourage water conservation.
- *Foxborough has an enterprise account which covers the costs of operation, proper maintenance, proposed capital improvements, and water conservation.*
 - *The Town has an increasing block rate structure.*
- 5) The proponent should bill its customers at least quarterly based on actual meter readings. Bills should be easily understandable to the customer (e.g. providing water use in gallons and including comparison of the previous year's use for same period).
- *Foxborough bills large commercial and industrial accounts monthly and small business and residential customers quarterly.*
 - *Bills appear to be easily understood.*
- 6) A drought/emergency contingency plan, as described in 313 CMR 4.02, should be in place. This plan should include seasonal use guidelines and measures for voluntary and mandatory water use restrictions and describe how these will be implemented. There should be a mechanism in place to tie water use restrictions to streamflow and/or surface water levels in the affected basin(s) where this information is available. The plan should be part of the Local Water Resources Management Plan required under Criterion #7.
- *In 1995, Foxborough adopted DEP's model bylaw for enforceable limitations of water use during periods of high demand and incorporated it into their water regulations. The water use restrictions are tied to water supply levels.*

² Data for 1996 through 1999 was corrected for meter irregularities. In early 1999, it was discovered that the primary metering element for Pumping Station No.1 had been reading incorrectly for many years. The faulty element was replaced in March of 1999. Correction data was provided with the application.

- *The Town has the ability to levy fines for violations.*
- 7) All government and other public buildings under the control of the proponent, should have been retrofit with water saving devices.
- *Foxborough has a program to retrofit municipal buildings with water saving devices, prioritizing those connected to the municipal sewer system first.*
 - *Retrofit of the Ahern School is scheduled to be completed by the Summer of 2001. The Water Department is pursuing the final schedule for retrofit of the High School.*
 - *Two other municipal school buildings have not been retrofit with water saving devices.*
- 8) Proponents should provide records of water audits conducted on public facilities. The most recent audit should have occurred within two years prior to the application for Interbasin Transfer approval.
- *Foxborough does not have a formal water audit program. The Water Department evaluates water usage data for inconsistencies.*
- 9) If the community's residential gallons per capita/day is greater than 65, the proponent should be implementing a comprehensive residential conservation program that seeks to reduce residential water use through a retrofit, rebate or other similarly effective program for encouraging installation of household water saving devices, including faucet aerators, showerheads and toilets and through efforts to reduce excessive outdoor water use.
- *Foxborough's residential gpcd was 75 in 1995; 66 in 1996; 76 in 1997, 74 in 1998, and 84 in 1999. The five year average is 75. The town has provided low-flow shower heads and faucet aerators to customers at cost. In addition, the Town distributes these devices free of charge in conjunction with its Drinking Water Month and Founders Day displays.*
 - *The town has also given these devices to home owners in areas to be sewerred.*
- 10) A broad-based public education program, which attempts to reach every user at least two times per year, through such means as mailings, billboards, newspaper articles, cable television announcements or programs, or the use of other media, should be in place. Water suppliers should refer to the WRC's 1992 "Water Conservation Standards for the Commonwealth of Massachusetts" and the Massachusetts Water Works Association for recommended public education measures.
- *Foxborough has a broad-based public education program, which includes school programs, municipal events, newsletters to customers, tours of water supply facilities, library displays, cable television programs, etc.*

- 11) A program which identifies and ranks all commercial, industrial and institutional customers according to amount of use, and requires regular contact with the largest users to promote water conservation, should be in place. The water supplier should make regular contact with these users to promote water conservation. Materials on water reuse and recirculation techniques should be provided, where appropriate.
- *The Water Department has worked with the Foxboro Company to reduce water usage by 94%. The Department has also worked with the NE Patriots to expand their in-town wastewater treatment plant and to reuse graywater for toilet flushing within the new stadium and adjacent Economic Development District.*
- 12) A program of land use controls to protect existing water supply sources of the receiving area that meet the requirements of the Department of Environmental Protection.
- *Foxborough has an extensive Wellhead Protection Program, approved by DEP, which includes a Water Resources Protection By-Law, an Earth Removal By-Law and Board of Health floor drain regulations and septic system requirements, and subdivision regulations.*
- 13) As part of the local water resources management plan, there should be a long-term water conservation program, which complies with the 1992 Water Conservation Standards for the Commonwealth of Massachusetts, in place. This plan should reflect the goal of maintaining unaccounted-for water at 10% or less of all water used, and of reducing future residential water use through a comprehensive residential water conservation program, if residential gpcd is greater than 65. The water conservation program should also have a goal of operating the system to balance water supply with other environmental needs. If the transfer is approved, the proponent will need to submit a copy of its Public Water Supply Annual Statistical Report (required by DEP) to the Commission annually to demonstrate the continued effectiveness of the program.
- *Foxborough has a comprehensive long-term water conservation plan, but it will need to be amended to meet both the 1992 Water Conservation Standards and the 1999 IBT Performance Standards.*

CRITERION #4: A comprehensive forestry management program which balances water yields, wildlife habitat, and natural beauty on watershed lands presently serving the receiving area and under control of the proponent has been implemented.

Not applicable

CRITERION #5: Reasonable instream flow in the river from which the water is transferred is maintained.

- *The exact recharge mechanisms between Lake Mirimichi, Witch Pond, and the sand and gravel aquifer are not well understood. Additional data are necessary to ascertain the seasonal patterns of ground water recharge to Witch Pond and the effects of precipitation and Lake Mirimichi levels on the interaction between ground water and surface water at the proposed well site.*
- *Aquifer water table levels near the pumping wells could be drawn down by up to 8.5 feet as a result of pumping the proposed wells. Long-term aquifer depletion is not expected at the DEP-approved pumping rates.*
- *Bungay Brook flow is dependent, in part, on the level of Witch Pond. Witch Pond and Bungay Brook could potentially be impacted by the proposed withdrawal during certain times of the year because ground water recharge from Lake Mirimichi in the Taunton River basin, which feeds Witch Pond and thus the brook may be intercepted by the pumping wells. The wells also have a potential to induce surface water infiltration from Witch Pond.*
- *Foxborough did not quantify the magnitude of impacts to Witch Pond levels that could be caused by pumping the proposed wells. The silty layer between the sand and gravel aquifer and the peat seems to minimize hydraulic interaction between the ground water and the surface water features in most locations, however. Additionally, the wells appear to have the potential to induce ground water recharge across the basin divide by their hydraulic influence and this may be a more significant source of recharge to the wells than surface water from Witch Pond.*
- *Because of the Wells' proximity to the Atlantic white cedar swamp, Witch Pond, and the wetland restoration area, the proposed Witch Pond Wells may have hydraulic influence on the surrounding wetlands.*
- *Low-permeability silt and peat layers appear to limit the hydraulic connection between surface water features and the lower sand and gravel aquifer near the proposed Witch Pond Wells site. A significant degree of hydraulic separation appears to exist between the ground water in the shallow peat and the sand and gravel aquifer.*
- *Pumping the proposed Witch Pond Wells will cause significant drawdown in the sand and gravel aquifer beneath the wetlands immediately surrounding the pumping wells.*
- *The Atlantic white cedar swamp surrounding the Witch Pond Wells and in the restoration area may be impacted by pumping. Seasonal inundation will continue to occur as a result of local precipitation. The effects of drawdown will be most pronounced immediately surrounding the wells.*
- *Impacts of the proposed Witch Pond Wells on other uses do not appear to be significant and can be controlled.*
- *A monitoring program can be used to verify expected conditions at the Witch Pond Wells site. Threshold water table levels can be used to control impacts of pumping on nearby surface water resources. The wells may not be viable for use throughout the summer months when the thresholds are applied.*

CRITERION #6: The results of the pump test have been used to indicate the potential impacts of this project on other environmental resources and adjacent wells.

- *Pumping test results were used to evaluate the potential impacts of this project on other environmental resources and adjacent wells.*

CRITERION #7: Communities have adopted or are actively engaged in developing a local water resources management plan.

- *Foxborough appears to have most of the components of a Local Water Resources Management Plan, as defined in Appendix B of the 1999 IBT Performance Standards. However these plans need to be consolidated, summarized, and analyzed as described in the Performance Standards.*
- *Foxborough is in the process of developing a Comprehensive Water Resources Management Plan (CWRMP) , according to the DEP guidelines.*
- *If the CWRMP under development meets the WRC's guidelines, this may be able to be substituted for a Local Water Resources Management Plan. Otherwise, it can be used as a component of the plan.*

CRITERION #8: The Commission shall consider the impacts of all past, authorized or proposed transfers in the donor basin.

- *It does not appear that use of the Witch Pond Wells together with all past, authorized or proposed transfers in the donor basin will adversely impact the resources of this area, if Foxborough commits to monitor use of this well and report potential impacts to DEP, NHESP and the WRC.*

EO 385

This decision is consistent with Executive Order 385, which has the dual objective of resource protection and sustainable development. The decision does not encourage growth without adequate infrastructure, nor does it cause an unavoidable loss of environmental quality or resources.